

Results of Directional Survey

API number:	30-025-41912		
OGRID:		Operator:	COG PRODUCTION, LLC
		Property:	CORVO FEDERAL # 4H

surface	ULSTR:	M	29	T 24S	R 32E
				190 FSL	560 FWL

BH Loc	ULSTR:	D	29	T 24S	R 32E
12886	MD	8439.1	TVD	380 FNL	493 FWL
4930 FSL					

Top Perf/OH	ULSTR:	M	29	T 24S	R 32E
8674	MD	8408.8	TVD	723 FSL	565 FWL

Bot Perf/OH	ULSTR:	D	29	T 24S	R 32E
12800	MD	8438.5	TVD	436 FNL	497 FWL
4844 FSL					

	MD	N/S	E/W	VD
	8642.00	501.80	4.50	8399.90
TOP PERFS/OH	8674.00	532.50	4.90	8408.80
	8674.00	532.50	4.90	8408.80
	12769.00	4623.10	-62.00	8438.10
BOT PERFS/OH	12800.00	4654.05	-63.33	8438.49
	12832.00	4686.00	-64.70	8438.90

NEXT TO LAST	12832.00	4686.00	-64.70	8438.90
LAST READING	12886.00	4740.00	-67.30	8439.10
TD	12886.00	4740.00	-67.30	8439.10

Surface Location	190	FS	560	FW
Projected BHL	4930	FS	493	FW
Location of				
Top Perfs/OH	723	FS	565	FW
Bottom Perfs/OH	4844	FS	497	FW

SUMMARY of Subsurface Locations

Surface Location	M-29-24S-32E	190	FS	560	FW	Vert. Depth
Top Perfs/OH	M-29-24S-32E	723	FS	565	FW	8408.80
Bottom Perfs/OH	D-29-24S-32E	4844	FS	497	FW	8438.49
Projected TD	D-29-24S-32E	4930	FS	493	FW	8439.10

FER 10 2015



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

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October 3, 2014

COG, LLC
One Concho Center
600 W. Illinois Ave.
Midland, TX 79701

RE: Corvo Federal #4H
190' FSL & 560' FWL
Sec. 29, T24S, R32E
Lea County, New Mexico

Dear Sir,

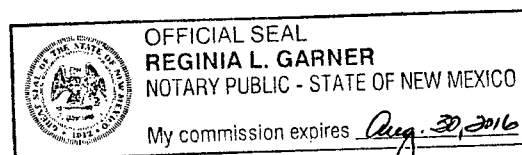
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Eddie LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 3rd day of October, 2014.

Notary Public

Corvo Federal 4H

Date	Depth	Deviation	Direction	TVD	Horiz Disp
9/13/2014	100	1.00	334.00		
9/13/2014	195	1.00	343.00		
9/13/2014	311	1.40	286.40		
9/13/2014	401	1.30	327.00		
9/13/2014	489	0.90	312.40		
9/13/2014	686	0.60	284.40		
9/13/2014	777	2.00	270.40		
9/16/2014	980	0.30	38.00		
9/16/2014	1226	0.20	31.00		
9/16/2014	1435	0.20	324.00		
9/16/2014	1619	0.70	168.40		
9/16/2014	1802	0.30	334.40		
9/16/2014	1984	0.30	76.40		
9/16/2014	2359	1.20	343.00		
9/16/2014	2548	1.00	85.40		
9/16/2014	2737	0.30	153.40		
9/17/2014	2926	0.10	330.00		
9/17/2014	3114	0.50	171.00		
9/17/2014	3303	0.60	264.40		
9/17/2014	3494	0.60	331.40		
9/17/2014	3715	0.70	352.00		
9/17/2014	3902	0.20	344.40		
9/17/2014	4090	0.80	42.40		
9/18/2014	4249	0.00	205.40		
9/18/2014	4445	0.20	108.40		
9/20/2014	4655	0.10	291.40		
9/20/2014	5031	0.20	269.40		
9/20/2014	5409	0.60	340.00		
9/20/2014	5851	0.80	357.00		
9/20/2014	6039	1.20	21.40		
9/20/2014	6229	0.40	4.40		
9/21/2014	6419	0.50	55.40		
9/21/2014	6638	0.20	190.40		
9/21/2014	6827	0.00	323.40		
9/21/2014	7017	0.60	146.40		
9/21/2014	7237	0.80	155.40		
9/21/2014	7427	0.90	155.00		
9/22/2014	7856	1.00	169.60	7855.00	8.90
9/22/2014	7919	5.70	4.90	7918.65	11.41
9/22/2014	7950	9.80	4.00	7949.40	15.58
9/23/2014	8045	25.20	356.20	8039.80	43.82
9/23/2014	8076	29.30	358.70	8067.34	58.02
9/23/2014	8171	41.70	2.60	8145.11	112.22
9/23/2014	8202	44.60	2.20	8167.00	133.00
9/23/2014	8233	46.70	1.30	8189.00	155.00

Date	Depth	Deviation	Direction	TVD	Horiz Disp
9/23/2014	8296	50.50	359.30	8231.00	202.00
9/23/2014	8327	51.70	359.20	8250.59	226.85
9/24/2014	8390	54.30	358.90	8288.00	277.00
9/24/2014	8421	56.20	0.30	8306.00	302.00
9/24/2014	8516	62.80	0.60	8354.06	384.63
9/24/2014	8553	58.90	0.20	8323.00	329.00
9/24/2014	8642	73.00	0.60	8399.89	501.75
9/24/2014	8706	77.60	1.70	8416.50	563.52
9/25/2014	8801	86.60	1.00	8428.00	657.61
9/25/2014	8990	92.00	0.20	8432.00	846.50
9/25/2014	9176	90.00	357.40	8427.09	
9/25/2014	9271	88.50	357.00	8428.33	
9/25/2014	9365	89.90	356.50		
9/25/2014	9460	90.50	355.00	8429.31	
9/25/2014	9553	89.30	356.40	8429.47	1408.76
9/25/2014	9646	89.80	358.50	8430.20	1501.69
9/25/2014	9741	87.70	358.10	8432.28	1596.64
9/26/2014	9835	89.30	357.70	8434.00	1690.56
9/26/2014	9930	90.10	357.30	8435.00	1785.49
9/26/2014	10025	91.30	359.90	8434.00	1880.96
9/26/2014	10215	91.10	0.00	8434.90	
9/26/2014	10310	86.90	359.10	8436.56	
9/26/2014	10404	89.50	0.60	8439.51	
9/26/2014	10500	90.60	0.20	8439.43	2355.33
9/26/2014	10594	89.80	0.60	8439.10	2449.32
9/26/2014	10783	90.80	1.00	8439.43	2638.25
9/27/2014	10878	91.30	0.70	8437.00	2733.21
9/27/2014	10973	92.00	359.80	8434.00	2828.78
9/28/2014	11160	88.40	0.30	8431.00	3015.09
9/28/2014	11255	88.40	0.30	8434.00	3110.06
9/28/2014	11349	89.80	0.30	8435.00	3204.04
9/28/2014	11538	91.00	359.90	8434.45	
9/28/2014	11633	89.20	0.00	8434.28	
9/28/2014	11728	90.10	359.80	8434.86	
9/28/2014	11822	89.00	359.10	8435.60	3677.02
9/28/2014	11917	90.70	358.20	8435.85	3772.00
9/29/2014	12012	87.90	359.50	8437.01	3866.00
9/29/2014	12106	90.40	359.70	8438.40	
9/29/2014	12201	90.80	357.40	8437.41	
9/29/2014	12296	88.20	357.00	8438.24	
9/29/2014	12390	91.50	357.00	8438.48	
9/30/2014	12485	90.40	357.40	8432.00	4339.72
9/30/2014	12579	89.10	357.20	8432.00	4433.54
9/30/2014	12769	88.90	357.70	8433.00	4623.00
9/30/2014	12832	89.80	357.00	8434.00	4686.00



October 9, 2014

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701

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Attn: Kanicia Castillo

Re: **Corvo Federal 4H**

Please find enclosed a copy of the survey from 0' to 7,764' ran on the above referenced well.

If I can be of any further service, please do not hesitate to call me at 800-606-4976.

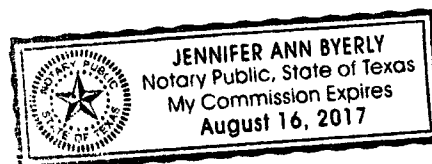
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 9 day of October A.D., 2014, by Keith Havelka.

Jennifer Byerly
Notary Public, State of Texas





Company: Concho Oil & Gas
Lease/Well: Corvo Federal/4H
Location: S: 29 T: 24S R: 32E
Rig Name: Silver Oak #7
State/County: New Mexico/Lea
Latitude: 32.18, Longitude: -103.70
GRID North is 0.34 Degrees East of True North
VS-Azi: 0.00 Degrees



HOBSOCK
JAN 30 2015
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Depth Reference : 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 10/9/2014 / 10:44

VES Survey International
West Texas
Surveyor: Neil Bates
(432) 563-5444
Corvo Federal 4H / API 30-025-41912

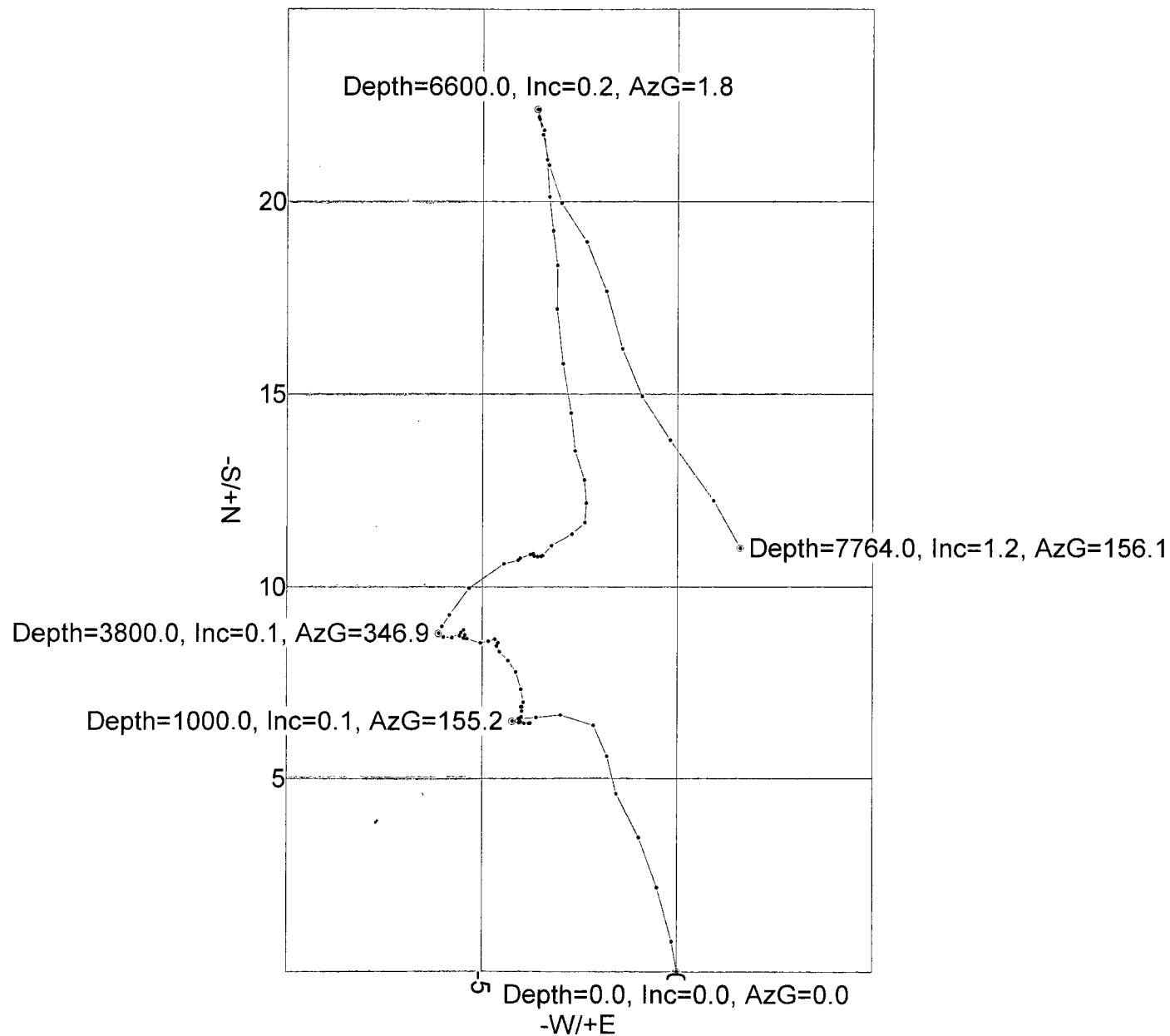
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.90	350.17	100.00	0.77	-0.13	0.77	0.79	350.17	0.90
200.00	0.78	338.59	199.99	2.18	-0.52	2.18	2.24	346.68	0.21
300.00	0.79	341.97	299.98	3.47	-0.98	3.47	3.61	344.26	0.05
400.00	0.68	322.68	399.97	4.60	-1.55	4.60	4.86	341.36	0.27
500.00	0.59	13.74	499.96	5.58	-1.79	5.58	5.86	342.21	0.55
600.00	0.65	303.33	599.96	6.39	-2.14	6.39	6.74	341.49	0.72
700.00	0.43	263.96	699.95	6.66	-2.98	6.66	7.30	335.89	0.42
800.00	0.30	264.11	799.95	6.60	-3.61	6.60	7.52	331.29	0.13
900.00	0.22	270.06	899.95	6.57	-4.06	6.57	7.72	328.27	0.09
1000.00	0.08	155.15	999.95	6.51	-4.22	6.51	7.76	327.02	0.26
1100.00	0.16	82.15	1099.95	6.47	-4.05	6.47	7.63	327.91	0.16
1200.00	0.14	108.00	1199.95	6.45	-3.79	6.45	7.48	329.52	0.07
1300.00	0.11	297.17	1299.95	6.45	-3.76	6.45	7.47	329.75	0.26
1400.00	0.10	235.65	1399.95	6.45	-3.93	6.45	7.55	328.67	0.11
1500.00	0.11	348.32	1499.95	6.49	-4.02	6.49	7.64	328.24	0.18
1600.00	0.06	58.92	1599.95	6.62	-3.99	6.62	7.73	328.90	0.11
1700.00	0.14	344.53	1699.95	6.77	-3.98	6.77	7.85	329.55	0.14
1800.00	0.01	147.73	1799.95	6.88	-4.01	6.88	7.96	329.79	0.15

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.03	94.00	1899.95	6.87	-3.98	6.87	7.94	329.96	0.03
2000.00	0.15	2.65	1999.95	7.00	-3.94	7.00	8.03	330.62	0.15
2100.00	0.25	341.43	2099.95	7.33	-4.00	7.33	8.36	331.37	0.13
2200.00	0.29	346.11	2199.95	7.79	-4.14	7.79	8.82	332.03	0.04
2300.00	0.17	288.32	2299.95	8.08	-4.33	8.08	9.17	331.79	0.25
2400.00	0.24	335.96	2399.95	8.31	-4.56	8.31	9.48	331.28	0.18
2500.00	0.04	170.91	2499.95	8.47	-4.64	8.47	9.65	331.30	0.28
2600.00	0.14	14.81	2599.95	8.55	-4.60	8.55	9.70	331.72	0.18
2700.00	0.13	258.21	2699.95	8.64	-4.68	8.64	9.82	331.58	0.23
2800.00	0.08	242.43	2799.95	8.59	-4.84	8.59	9.86	330.57	0.06
2900.00	0.17	265.07	2899.95	8.54	-5.05	8.54	9.92	329.39	0.10
3000.00	0.26	302.80	2999.94	8.65	-5.39	8.65	10.20	328.07	0.16
3100.00	0.06	181.26	3099.94	8.72	-5.59	8.72	10.36	327.37	0.30
3200.00	0.12	94.17	3199.94	8.66	-5.48	8.66	10.25	327.68	0.13
3300.00	0.13	323.39	3299.94	8.75	-5.44	8.75	10.30	328.11	0.23
3400.00	0.06	44.08	3399.94	8.88	-5.48	8.88	10.43	328.34	0.14
3500.00	0.17	224.28	3499.94	8.81	-5.54	8.81	10.41	327.83	0.23
3600.00	0.15	260.66	3599.94	8.68	-5.77	8.68	10.43	326.38	0.10
3700.00	0.12	286.88	3699.94	8.69	-6.00	8.69	10.56	325.39	0.07
3800.00	0.09	346.85	3799.94	8.80	-6.12	8.80	10.71	325.19	0.11
3900.00	0.16	45.23	3899.94	8.97	-6.03	8.97	10.81	326.09	0.14
4000.00	0.24	24.37	3999.94	9.27	-5.84	9.27	10.96	327.77	0.11
4100.00	0.74	39.15	4099.94	9.97	-5.35	9.97	11.31	331.79	0.51
4200.00	0.58	75.11	4199.93	10.60	-4.45	10.60	11.49	337.24	0.44
4300.00	0.15	251.03	4299.93	10.69	-4.08	10.69	11.44	339.10	0.73
4400.00	0.23	60.96	4399.93	10.74	-4.03	10.74	11.47	339.45	0.38
4500.00	0.09	90.45	4499.93	10.84	-3.77	10.84	11.48	340.83	0.16
4600.00	0.03	335.78	4599.93	10.86	-3.69	10.86	11.47	341.21	0.11
4700.00	0.10	157.65	4699.93	10.80	-3.67	10.80	11.41	341.23	0.13
4800.00	0.10	41.99	4799.93	10.79	-3.58	10.79	11.36	341.65	0.17
4900.00	0.07	163.29	4899.93	10.79	-3.50	10.79	11.34	342.03	0.15
5000.00	0.10	16.96	4999.93	10.81	-3.45	10.81	11.35	342.28	0.17
5100.00	0.31	50.40	5099.93	11.07	-3.22	11.07	11.53	343.79	0.23
5200.00	0.39	68.83	5199.93	11.37	-2.69	11.37	11.68	346.67	0.14
5300.00	0.21	3.08	5299.93	11.67	-2.37	11.67	11.91	348.54	0.36
5400.00	0.37	4.29	5399.92	12.18	-2.33	12.18	12.40	349.15	0.16
5500.00	0.33	345.07	5499.92	12.78	-2.38	12.78	13.00	349.43	0.12
5600.00	0.57	341.13	5599.92	13.53	-2.62	13.53	13.78	349.04	0.24
5700.00	0.59	6.58	5699.91	14.51	-2.72	14.51	14.76	349.38	0.26

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	0.94	340.72	5799.91	15.80	-2.93	15.80	16.07	349.48	0.48
5900.00	0.76	9.82	5899.90	17.22	-3.09	17.22	17.49	349.83	0.46
6000.00	0.56	347.92	5999.89	18.35	-3.08	18.35	18.61	350.47	0.32
6100.00	0.48	358.47	6099.88	19.25	-3.19	19.25	19.51	350.58	0.13
6200.00	0.54	349.21	6199.88	20.12	-3.29	20.12	20.39	350.71	0.10
6300.00	0.57	2.75	6299.88	21.08	-3.36	21.08	21.35	350.95	0.13
6400.00	0.33	340.16	6399.87	21.85	-3.43	21.85	22.12	351.07	0.29
6500.00	0.09	332.00	6499.87	22.19	-3.57	22.19	22.48	350.87	0.25
6600.00	0.15	1.80	6599.87	22.39	-3.60	22.39	22.68	350.87	0.09
6700.00	0.17	164.71	6699.87	22.39	-3.55	22.39	22.67	350.98	0.32
6800.00	0.13	197.13	6799.87	22.14	-3.55	22.14	22.42	350.89	0.09
6900.00	0.37	157.83	6899.87	21.73	-3.46	21.73	22.00	350.95	0.29
7000.00	0.56	176.21	6999.87	20.94	-3.30	20.94	21.20	351.03	0.23
7100.00	0.66	149.57	7099.86	19.96	-2.98	19.96	20.18	351.51	0.30
7200.00	0.70	144.85	7199.85	18.96	-2.33	18.96	19.10	352.98	0.07
7300.00	0.92	168.41	7299.85	17.68	-1.82	17.68	17.77	354.12	0.39
7400.00	0.86	160.72	7399.83	16.18	-1.41	16.18	16.24	355.01	0.13
7500.00	0.67	154.15	7499.82	14.94	-0.91	14.94	14.97	356.53	0.21
7600.00	0.87	142.81	7599.81	13.80	-0.19	13.80	13.81	359.21	0.25
7700.00	1.33	146.04	7699.80	12.24	0.92	12.24	12.27	4.28	0.46
7764.00	1.21	156.14	7763.78	11.01	1.60	11.01	11.12	8.28	0.39



VES Survey International
West Texas
Surveyor: Neil Bates
(432) 563-5444
Corvo Federal 4H / API 30-025-41912



VES Survey Date: 09/21/2014

COG Production LLC

Lea County, N.M.

Section 29-24S-32E Corvo Federal #4H

Corvo Federal #4H

Original Hole

Design: Original Hole

Survey Report - Geographic

01 October, 2014

HOBBSCOCD

JAN 30 2015

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gm

Stryker Directional Survey Report - Geographic

Company:	COG Production LLC	Local Co-ordinate Reference:	Well Corvo Federal #4H
Project:	Lea County, N.M.	TVD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Site:	Section 29-24S-32E Corvo Federal #4H	MD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Well:	Corvo Federal #4H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Project	Lea County, N.M.		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Section 29-24S-32E Corvo Federal #4H		
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Site Position:		Northing:	430,335.80 usft	Latitude:	32° 10' 53.541 N
From:	Map	Easting:	695,035.70 usft	Longitude:	103° 42' 10.568 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.34 °

Well	Corvo Federal #4H				
Well Position	+N/-S	0.0 usft	Northing:	430,335.80 usft	Latitude: 32° 10' 53.541 N
	+E/-W	0.0 usft	Easting:	695,035.70 usft	Longitude: 103° 42' 10.568 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level: 3,501.8 usft

Wellbore	Original Hole				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/20/2014	7.30	60.06	48,300

Design	Original Hole				
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	359.63

Survey Program		Date 10/1/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	7,764.0	VES Gyro Survey (Original Hole)	NSG-CT_WL	Continuous north-seeking gyro on wireline	
7,824.0	12,886.0	Stryker MWD Survey (Original Hole)	MWD	MWD - Standard	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	430,335.80	695,035.70	32° 10' 53.541 N	103° 42' 10.568 W
100.0	0.90	350.17	100.0	0.8	-0.1	430,336.57	695,035.56	32° 10' 53.549 N	103° 42' 10.569 W
200.0	0.78	338.59	200.0	2.2	-0.5	430,337.98	695,035.18	32° 10' 53.563 N	103° 42' 10.574 W
300.0	0.79	341.97	300.0	3.5	-1.0	430,339.27	695,034.72	32° 10' 53.575 N	103° 42' 10.579 W
400.0	0.68	322.68	400.0	4.6	-1.6	430,340.40	695,034.14	32° 10' 53.587 N	103° 42' 10.585 W
500.0	0.59	13.74	500.0	5.6	-1.8	430,341.37	695,033.91	32° 10' 53.596 N	103° 42' 10.588 W
600.0	0.65	303.33	600.0	6.4	-2.1	430,342.18	695,033.55	32° 10' 53.604 N	103° 42' 10.592 W
700.0	0.43	263.96	700.0	6.7	-3.0	430,342.45	695,032.71	32° 10' 53.607 N	103° 42' 10.602 W
800.0	0.30	264.11	800.0	6.6	-3.6	430,342.39	695,032.07	32° 10' 53.606 N	103° 42' 10.609 W
900.0	0.22	270.06	900.0	6.6	-4.1	430,342.36	695,031.62	32° 10' 53.606 N	103° 42' 10.615 W
1,000.0	0.08	155.15	1,000.0	6.5	-4.2	430,342.30	695,031.46	32° 10' 53.606 N	103° 42' 10.617 W

Stryker Directional Survey Report - Geographic

Company:	COG Production LLC	Local Co-ordinate Reference:	Well Corvo Federal #4H
Project:	Lea County, N.M.	TVD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Site:	Section 29-24S-32E Corvo Federal #4H	MD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Well:	Corvo Federal #4H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,100.0	0.16	82.15	1,100.0	6.5	-4.1	430,342.25	695,031.63	32° 10' 53.605 N	103° 42' 10.615 W
1,200.0	0.14	108.00	1,199.9	6.4	-3.8	430,342.23	695,031.88	32° 10' 53.605 N	103° 42' 10.612 W
1,300.0	0.11	297.17	1,299.9	6.4	-3.8	430,342.24	695,031.91	32° 10' 53.605 N	103° 42' 10.611 W
1,400.0	0.10	235.65	1,399.9	6.4	-3.9	430,342.24	695,031.75	32° 10' 53.605 N	103° 42' 10.613 W
1,500.0	0.11	348.32	1,499.9	6.5	-4.0	430,342.28	695,031.66	32° 10' 53.605 N	103° 42' 10.614 W
1,600.0	0.06	58.92	1,599.9	6.6	-4.0	430,342.40	695,031.69	32° 10' 53.607 N	103° 42' 10.614 W
1,700.0	0.14	344.53	1,699.9	6.7	-4.0	430,342.55	695,031.70	32° 10' 53.608 N	103° 42' 10.614 W
1,800.0	0.01	147.73	1,799.9	6.9	-4.0	430,342.66	695,031.67	32° 10' 53.609 N	103° 42' 10.614 W
1,900.0	0.03	94.00	1,899.9	6.8	-4.0	430,342.65	695,031.70	32° 10' 53.609 N	103° 42' 10.614 W
2,000.0	0.15	2.65	1,999.9	7.0	-4.0	430,342.78	695,031.74	32° 10' 53.610 N	103° 42' 10.613 W
2,100.0	0.25	341.43	2,099.9	7.3	-4.0	430,343.11	695,031.67	32° 10' 53.614 N	103° 42' 10.614 W
2,200.0	0.29	346.11	2,199.9	7.8	-4.2	430,343.57	695,031.54	32° 10' 53.618 N	103° 42' 10.615 W
2,300.0	0.17	288.32	2,299.9	8.1	-4.4	430,343.86	695,031.34	32° 10' 53.621 N	103° 42' 10.618 W
2,400.0	0.24	335.96	2,399.9	8.3	-4.6	430,344.10	695,031.11	32° 10' 53.623 N	103° 42' 10.620 W
2,500.0	0.04	170.91	2,499.9	8.5	-4.7	430,344.25	695,031.03	32° 10' 53.625 N	103° 42' 10.621 W
2,600.0	0.14	14.81	2,599.9	8.5	-4.6	430,344.34	695,031.07	32° 10' 53.626 N	103° 42' 10.621 W
2,700.0	0.13	258.21	2,699.9	8.6	-4.7	430,344.43	695,030.99	32° 10' 53.627 N	103° 42' 10.622 W
2,800.0	0.08	242.43	2,799.9	8.6	-4.9	430,344.38	695,030.82	32° 10' 53.626 N	103° 42' 10.624 W
2,900.0	0.17	265.07	2,899.9	8.5	-5.1	430,344.33	695,030.61	32° 10' 53.626 N	103° 42' 10.626 W
3,000.0	0.26	302.80	2,999.9	8.6	-5.4	430,344.44	695,030.27	32° 10' 53.627 N	103° 42' 10.630 W
3,100.0	0.06	181.26	3,099.9	8.7	-5.6	430,344.51	695,030.08	32° 10' 53.628 N	103° 42' 10.632 W
3,200.0	0.12	94.17	3,199.9	8.7	-5.5	430,344.45	695,030.18	32° 10' 53.627 N	103° 42' 10.631 W
3,300.0	0.13	323.39	3,299.9	8.7	-5.5	430,344.54	695,030.22	32° 10' 53.628 N	103° 42' 10.631 W
3,400.0	0.06	44.08	3,399.9	8.9	-5.5	430,344.66	695,030.19	32° 10' 53.629 N	103° 42' 10.631 W
3,500.0	0.17	224.28	3,499.9	8.8	-5.6	430,344.60	695,030.12	32° 10' 53.628 N	103° 42' 10.632 W
3,600.0	0.15	260.66	3,599.9	8.7	-5.8	430,344.47	695,029.89	32° 10' 53.627 N	103° 42' 10.635 W
3,700.0	0.12	286.88	3,699.9	8.7	-6.0	430,344.48	695,029.66	32° 10' 53.627 N	103° 42' 10.637 W
3,800.0	0.09	346.85	3,799.9	8.8	-6.2	430,344.58	695,029.54	32° 10' 53.628 N	103° 42' 10.639 W
3,900.0	0.16	45.23	3,899.9	9.0	-6.1	430,344.76	695,029.62	32° 10' 53.630 N	103° 42' 10.638 W
4,000.0	0.24	24.37	3,999.9	9.2	-5.9	430,345.05	695,029.81	32° 10' 53.633 N	103° 42' 10.636 W
4,100.0	0.74	39.15	4,099.9	9.9	-5.4	430,345.74	695,030.30	32° 10' 53.640 N	103° 42' 10.630 W
4,200.0	0.58	75.11	4,199.9	10.6	-4.5	430,346.37	695,031.20	32° 10' 53.646 N	103° 42' 10.619 W
4,300.0	0.15	251.03	4,299.9	10.7	-4.1	430,346.46	695,031.56	32° 10' 53.647 N	103° 42' 10.615 W
4,400.0	0.23	60.96	4,399.9	10.7	-4.1	430,346.51	695,031.61	32° 10' 53.647 N	103° 42' 10.614 W
4,500.0	0.09	90.45	4,499.9	10.8	-3.8	430,346.61	695,031.87	32° 10' 53.648 N	103° 42' 10.611 W
4,600.0	0.03	335.78	4,599.9	10.8	-3.8	430,346.63	695,031.94	32° 10' 53.648 N	103° 42' 10.611 W
4,700.0	0.10	157.65	4,699.9	10.8	-3.7	430,346.58	695,031.96	32° 10' 53.648 N	103° 42' 10.610 W
4,800.0	0.10	41.99	4,799.9	10.8	-3.6	430,346.56	695,032.05	32° 10' 53.648 N	103° 42' 10.609 W
4,900.0	0.07	163.29	4,899.9	10.8	-3.6	430,346.57	695,032.13	32° 10' 53.648 N	103° 42' 10.608 W
5,000.0	0.10	16.96	4,999.9	10.8	-3.5	430,346.59	695,032.17	32° 10' 53.648 N	103° 42' 10.608 W
5,100.0	0.31	50.40	5,099.9	11.0	-3.3	430,346.85	695,032.40	32° 10' 53.651 N	103° 42' 10.605 W
5,200.0	0.39	68.83	5,199.9	11.3	-2.8	430,347.14	695,032.93	32° 10' 53.653 N	103° 42' 10.599 W
5,300.0	0.21	3.08	5,299.9	11.6	-2.4	430,347.45	695,033.26	32° 10' 53.656 N	103° 42' 10.595 W
5,400.0	0.37	4.29	5,399.9	12.2	-2.4	430,347.95	695,033.29	32° 10' 53.661 N	103° 42' 10.595 W
5,500.0	0.33	345.07	5,499.9	12.8	-2.5	430,348.55	695,033.24	32° 10' 53.667 N	103° 42' 10.595 W
5,600.0	0.57	341.13	5,599.9	13.5	-2.7	430,349.30	695,033.01	32° 10' 53.675 N	103° 42' 10.598 W
5,700.0	0.59	6.58	5,699.9	14.5	-2.8	430,350.28	695,032.90	32° 10' 53.685 N	103° 42' 10.599 W
5,800.0	0.94	340.72	5,799.9	15.8	-3.0	430,351.57	695,032.69	32° 10' 53.697 N	103° 42' 10.602 W
5,900.0	0.76	9.82	5,899.9	17.2	-3.2	430,353.00	695,032.53	32° 10' 53.711 N	103° 42' 10.603 W
6,000.0	0.56	347.92	5,999.9	18.3	-3.2	430,354.13	695,032.54	32° 10' 53.723 N	103° 42' 10.603 W
6,100.0	0.48	358.47	6,099.9	19.2	-3.3	430,355.03	695,032.43	32° 10' 53.731 N	103° 42' 10.604 W
6,200.0	0.54	349.21	6,199.9	20.1	-3.4	430,355.91	695,032.33	32° 10' 53.740 N	103° 42' 10.605 W
6,300.0	0.57	2.75	6,299.9	21.1	-3.4	430,356.87	695,032.27	32° 10' 53.750 N	103° 42' 10.606 W
6,400.0	0.33	340.16	6,399.9	21.8	-3.5	430,357.64	695,032.19	32° 10' 53.757 N	103° 42' 10.607 W
6,500.0	0.09	332.00	6,499.9	22.2	-3.6	430,357.98	695,032.06	32° 10' 53.761 N	103° 42' 10.608 W

Stryker Directional

Survey Report - Geographic

Company:	COG Production LLC	Local Co-ordinate Reference:	Well Corvo Federal #4H
Project:	Lea County, N.M.	TVD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Site:	Section 29-24S-32E Corvo Federal #4H	MD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Well:	Corvo Federal #4H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
6,600.0	0.15	1.80	6,599.9	22.4	-3.7	430,358.18	695,032.03	32° 10' 53.763 N	103° 42' 10.609 W	
6,700.0	0.17	164.71	6,699.9	22.4	-3.6	430,358.16	695,032.07	32° 10' 53.763 N	103° 42' 10.608 W	
6,800.0	0.13	197.13	6,799.9	22.1	-3.6	430,357.91	695,032.08	32° 10' 53.760 N	103° 42' 10.608 W	
6,900.0	0.37	157.83	6,899.9	21.7	-3.5	430,357.50	695,032.16	32° 10' 53.756 N	103° 42' 10.607 W	
7,000.0	0.56	176.21	6,999.9	20.9	-3.4	430,356.72	695,032.32	32° 10' 53.748 N	103° 42' 10.606 W	
7,100.0	0.66	149.57	7,099.9	19.9	-3.1	430,355.73	695,032.64	32° 10' 53.738 N	103° 42' 10.602 W	
7,200.0	0.70	144.85	7,199.9	18.9	-2.4	430,354.74	695,033.29	32° 10' 53.729 N	103° 42' 10.594 W	
7,300.0	0.92	168.41	7,299.8	17.7	-1.9	430,353.45	695,033.80	32° 10' 53.716 N	103° 42' 10.589 W	
7,400.0	0.86	160.72	7,399.8	16.2	-1.5	430,351.96	695,034.21	32° 10' 53.701 N	103° 42' 10.584 W	
7,500.0	0.67	154.15	7,499.8	14.9	-1.0	430,350.72	695,034.71	32° 10' 53.689 N	103° 42' 10.578 W	
7,600.0	0.87	142.81	7,599.8	13.8	-0.3	430,349.59	695,035.42	32° 10' 53.677 N	103° 42' 10.570 W	
7,700.0	1.33	146.04	7,699.8	12.2	0.8	430,348.02	695,036.53	32° 10' 53.662 N	103° 42' 10.557 W	
7,764.0	1.21	156.14	7,763.8	11.0	1.5	430,346.79	695,037.22	32° 10' 53.650 N	103° 42' 10.549 W	
7764' VES Gyro Survey										
7,824.0	1.50	163.40	7,823.8	9.7	2.0	430,345.46	695,037.70	32° 10' 53.636 N	103° 42' 10.544 W	
7,856.0	1.00	169.60	7,855.8	9.0	2.2	430,344.78	695,037.87	32° 10' 53.630 N	103° 42' 10.542 W	
7,887.0	2.10	344.60	7,886.8	9.3	2.1	430,345.06	695,037.77	32° 10' 53.633 N	103° 42' 10.543 W	
7,919.0	5.70	4.90	7,918.7	11.4	2.1	430,347.21	695,037.75	32° 10' 53.654 N	103° 42' 10.543 W	
7,950.0	9.80	4.00	7,949.4	15.6	2.4	430,351.38	695,038.06	32° 10' 53.695 N	103° 42' 10.539 W	
7,982.0	14.80	357.70	7,980.6	22.4	2.4	430,358.19	695,038.09	32° 10' 53.762 N	103° 42' 10.538 W	
8,013.0	19.90	354.60	8,010.2	31.6	1.7	430,367.40	695,037.43	32° 10' 53.854 N	103° 42' 10.545 W	
8,045.0	25.20	356.20	8,039.8	43.8	0.8	430,379.63	695,036.47	32° 10' 53.975 N	103° 42' 10.556 W	
8,076.0	29.30	358.70	8,067.3	58.0	0.2	430,393.80	695,035.86	32° 10' 54.115 N	103° 42' 10.562 W	
8,108.0	32.60	0.70	8,094.8	74.5	0.1	430,410.26	695,035.79	32° 10' 54.278 N	103° 42' 10.562 W	
8,140.0	36.70	1.70	8,121.1	92.6	0.5	430,428.44	695,036.18	32° 10' 54.458 N	103° 42' 10.556 W	
8,171.0	41.70	2.60	8,145.1	112.2	1.2	430,448.01	695,036.92	32° 10' 54.651 N	103° 42' 10.546 W	
8,202.0	44.60	2.20	8,167.7	133.4	2.1	430,469.19	695,037.80	32° 10' 54.861 N	103° 42' 10.534 W	
8,233.0	46.70	1.30	8,189.4	155.6	2.8	430,491.35	695,038.48	32° 10' 55.080 N	103° 42' 10.525 W	
8,264.0	48.40	359.70	8,210.3	178.4	3.0	430,514.22	695,038.67	32° 10' 55.306 N	103° 42' 10.521 W	
8,296.0	50.50	359.30	8,231.1	202.7	2.8	430,538.53	695,038.46	32° 10' 55.547 N	103° 42' 10.522 W	
8,327.0	51.70	359.20	8,250.6	226.9	2.4	430,562.66	695,038.14	32° 10' 55.786 N	103° 42' 10.524 W	
8,358.0	53.30	359.10	8,269.4	251.4	2.1	430,587.25	695,037.78	32° 10' 56.029 N	103° 42' 10.526 W	
8,390.0	54.30	358.90	8,288.3	277.3	1.6	430,613.07	695,037.33	32° 10' 56.285 N	103° 42' 10.530 W	
8,421.0	56.20	0.30	8,306.0	302.7	1.5	430,638.53	695,037.15	32° 10' 56.537 N	103° 42' 10.530 W	
8,453.0	58.90	0.20	8,323.2	329.7	1.6	430,665.53	695,037.27	32° 10' 56.804 N	103° 42' 10.527 W	
8,485.0	60.50	0.80	8,339.3	357.4	1.8	430,693.16	695,037.51	32° 10' 57.077 N	103° 42' 10.522 W	
8,516.0	62.80	0.60	8,354.0	384.6	2.2	430,720.44	695,037.85	32° 10' 57.347 N	103° 42' 10.516 W	
8,548.0	65.80	0.80	8,367.9	413.5	2.5	430,749.27	695,038.20	32° 10' 57.632 N	103° 42' 10.510 W	
8,579.0	69.10	1.60	8,379.8	442.1	3.1	430,777.89	695,038.80	32° 10' 57.916 N	103° 42' 10.501 W	
8,611.0	71.80	1.50	8,390.5	472.2	3.9	430,808.03	695,039.62	32° 10' 58.214 N	103° 42' 10.490 W	
8,642.0	73.00	0.60	8,399.9	501.8	4.5	430,837.57	695,040.16	32° 10' 58.506 N	103° 42' 10.482 W	
8,674.0	74.60	1.20	8,408.8	532.5	4.9	430,868.30	695,040.64	32° 10' 58.810 N	103° 42' 10.474 W	
8,706.0	77.60	1.70	8,416.5	563.5	5.7	430,899.35	695,041.43	32° 10' 59.117 N	103° 42' 10.463 W	
8,737.0	81.10	1.30	8,422.2	594.0	6.5	430,929.80	695,042.22	32° 10' 59.419 N	103° 42' 10.451 W	
8,769.0	85.00	1.20	8,426.1	625.7	7.2	430,961.55	695,042.92	32° 10' 59.733 N	103° 42' 10.441 W	
8,801.0	86.60	1.00	8,428.4	657.7	7.8	430,993.45	695,043.53	32° 11' 0.049 N	103° 42' 10.432 W	
8,864.0	88.70	0.70	8,431.0	720.6	8.8	431,056.39	695,044.46	32° 11' 0.671 N	103° 42' 10.417 W	
8,895.0	89.90	1.00	8,431.4	751.6	9.2	431,087.38	695,044.92	32° 11' 0.978 N	103° 42' 10.409 W	
8,990.0	92.00	0.20	8,429.8	846.6	10.2	431,182.36	695,045.92	32° 11' 1.918 N	103° 42' 10.391 W	
9,082.0	90.70	359.20	8,427.7	938.5	9.7	431,274.33	695,045.44	32° 11' 2.828 N	103° 42' 10.390 W	
9,176.0	90.00	357.40	8,427.1	1,032.5	7.0	431,368.28	695,042.65	32° 11' 3.758 N	103° 42' 10.416 W	
9,271.0	88.50	357.00	8,428.3	1,127.4	2.3	431,463.16	695,038.01	32° 11' 4.697 N	103° 42' 10.464 W	
9,365.0	89.90	356.50	8,429.6	1,221.2	-3.0	431,557.00	695,032.68	32° 11' 5.626 N	103° 42' 10.519 W	
9,460.0	90.50	355.00	8,429.3	1,315.9	-10.1	431,651.73	695,025.64	32° 11' 6.564 N	103° 42' 10.595 W	
9,553.0	89.30	356.40	8,429.5	1,408.7	-17.0	431,744.46	695,018.67	32° 11' 7.482 N	103° 42' 10.670 W	

Stryker Directional

Survey Report - Geographic

Company:	COG Production LLC	Local Co-ordinate Reference:	Well Corvo Federal #4H
Project:	Lea County, N.M.	TVD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Site:	Section 29-24S-32E Corvo Federal #4H	MD Reference:	GL 3501.8 + 18 @ 3519.8usft (Silver Oak #7)
Well:	Corvo Federal #4H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,646.0	89.80	358.50	8,430.2	1,501.6	-21.2	431,837.36	695,014.53	32° 11' 8.401 N	103° 42' 10.712 W	
9,741.0	87.70	358.10	8,432.3	1,596.5	-24.0	431,932.29	695,011.71	32° 11' 9.341 N	103° 42' 10.738 W	
9,835.0	89.30	357.70	8,434.7	1,690.4	-27.4	432,026.20	695,008.27	32° 11' 10.270 N	103° 42' 10.772 W	
9,930.0	90.10	357.30	8,435.2	1,785.3	-31.6	432,121.10	695,004.12	32° 11' 11.210 N	103° 42' 10.813 W	
10,025.0	91.30	359.90	8,434.1	1,880.3	-33.9	432,216.06	695,001.80	32° 11' 12.150 N	103° 42' 10.834 W	
10,120.0	88.30	359.70	8,434.4	1,975.2	-34.2	432,311.05	695,001.47	32° 11' 13.090 N	103° 42' 10.831 W	
10,215.0	91.10	0.00	8,434.9	2,070.2	-34.5	432,406.03	695,001.22	32° 11' 14.030 N	103° 42' 10.828 W	
10,310.0	86.90	359.10	8,436.6	2,165.2	-35.2	432,500.99	695,000.48	32° 11' 14.969 N	103° 42' 10.830 W	
10,404.0	89.50	0.60	8,439.5	2,259.1	-35.5	432,594.94	695,000.23	32° 11' 15.899 N	103° 42' 10.826 W	
10,500.0	90.60	0.20	8,439.4	2,355.1	-34.8	432,690.93	695,000.90	32° 11' 16.849 N	103° 42' 10.812 W	
10,594.0	89.80	0.60	8,439.1	2,449.1	-34.1	432,784.93	695,001.56	32° 11' 17.779 N	103° 42' 10.798 W	
10,689.0	89.50	1.40	8,439.7	2,544.1	-32.5	432,879.91	695,003.22	32° 11' 18.719 N	103° 42' 10.772 W	
10,783.0	90.80	1.00	8,439.4	2,638.1	-30.5	432,973.89	695,005.19	32° 11' 19.649 N	103° 42' 10.743 W	
10,878.0	91.30	0.70	8,437.7	2,733.1	-29.1	433,068.86	695,006.60	32° 11' 20.589 N	103° 42' 10.720 W	
10,973.0	92.00	359.80	8,435.0	2,828.0	-28.7	433,163.82	695,007.01	32° 11' 21.528 N	103° 42' 10.709 W	
11,068.0	91.60	0.60	8,432.0	2,923.0	-28.4	433,258.77	695,007.34	32° 11' 22.468 N	103° 42' 10.698 W	
11,160.0	88.40	0.30	8,432.0	3,015.0	-27.6	433,350.76	695,008.06	32° 11' 23.378 N	103° 42' 10.684 W	
11,255.0	88.80	0.30	8,434.3	3,109.9	-27.1	433,445.73	695,008.56	32° 11' 24.318 N	103° 42' 10.671 W	
11,349.0	89.80	0.30	8,435.4	3,203.9	-26.6	433,539.72	695,009.05	32° 11' 25.248 N	103° 42' 10.659 W	
11,443.0	90.20	359.30	8,435.4	3,297.9	-27.0	433,633.72	695,008.72	32° 11' 26.178 N	103° 42' 10.657 W	
11,538.0	91.00	359.90	8,434.4	3,392.9	-27.6	433,728.71	695,008.06	32° 11' 27.118 N	103° 42' 10.658 W	
11,633.0	89.20	0.00	8,434.3	3,487.9	-27.7	433,823.70	695,007.98	32° 11' 28.058 N	103° 42' 10.652 W	
11,728.0	90.10	359.80	8,434.9	3,582.9	-27.9	433,918.70	695,007.81	32° 11' 28.998 N	103° 42' 10.648 W	
11,822.0	89.00	359.10	8,435.6	3,676.9	-28.8	434,012.69	695,006.91	32° 11' 29.929 N	103° 42' 10.652 W	
11,917.0	90.70	358.20	8,435.9	3,771.9	-31.0	434,107.66	695,004.67	32° 11' 30.869 N	103° 42' 10.671 W	
12,012.0	87.90	359.50	8,437.0	3,866.8	-32.9	434,202.62	695,002.77	32° 11' 31.808 N	103° 42' 10.687 W	
12,106.0	90.40	359.70	8,438.4	3,960.8	-33.6	434,296.60	695,002.11	32° 11' 32.738 N	103° 42' 10.688 W	
12,201.0	90.80	357.40	8,437.4	4,055.8	-36.0	434,391.56	694,999.71	32° 11' 33.678 N	103° 42' 10.710 W	
12,296.0	88.20	357.00	8,438.2	4,150.6	-40.6	434,486.43	694,995.07	32° 11' 34.617 N	103° 42' 10.757 W	
12,390.0	91.50	357.00	8,438.5	4,244.5	-45.5	434,580.29	694,990.15	32° 11' 35.546 N	103° 42' 10.808 W	
12,485.0	90.40	357.40	8,436.9	4,339.4	-50.2	434,675.16	694,985.51	32° 11' 36.486 N	103° 42' 10.856 W	
12,579.0	89.10	357.20	8,437.3	4,433.3	-54.6	434,769.06	694,981.08	32° 11' 37.415 N	103° 42' 10.901 W	
12,674.0	90.50	358.10	8,437.7	4,528.2	-58.5	434,863.97	694,977.18	32° 11' 38.354 N	103° 42' 10.940 W	
12,769.0	88.90	357.70	8,438.1	4,623.1	-62.0	434,958.90	694,973.70	32° 11' 39.294 N	103° 42' 10.974 W	
12,832.0	89.80	357.30	8,438.9	4,686.0	-64.7	435,021.84	694,970.96	32° 11' 39.917 N	103° 42' 11.001 W	
12,886.0	89.80	357.30	8,439.1	4,740.0	-67.3	435,075.78	694,968.41	32° 11' 40.451 N	103° 42' 11.027 W	

12886' MD Projected to Bit

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
7,764.0	7,763.8	11.0	1.5	7764' VES Gyro Survey	
12,886.0	8,439.1	4,740.0	-67.3	12886' MD Projected to Bit	